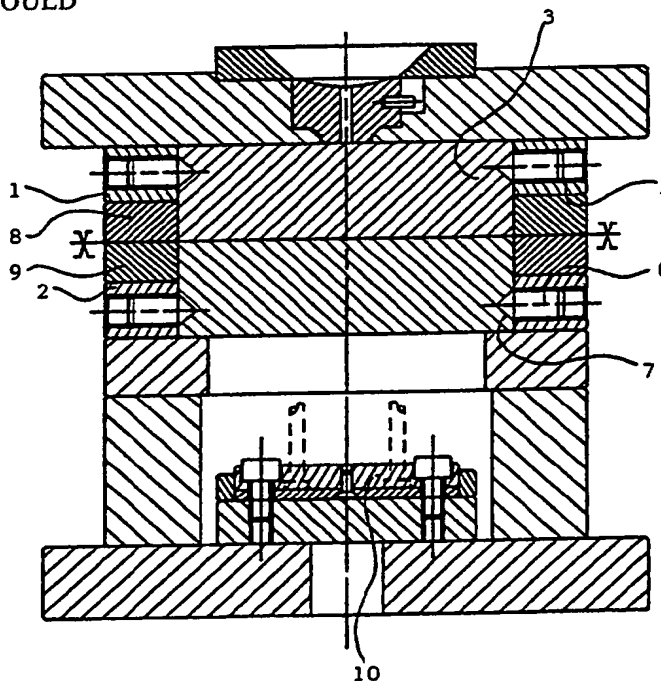


(51) International Patent Classification ⁵ : B29C 33/30, 45/26	A1	(11) International Publication Number: WO 90/08022 (43) International Publication Date: 26 July 1990 (26.07.90)
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(81) Designated States: AT, AT (European patent), AU, BE (European patent), BR, CA, CH, CH (European patent), DE, DE (European patent), DK, DK (European patent), ES (European patent), FR (European patent), GB, GB (European patent), IT (European patent), JP, KR, LU (European patent), NL, NL (European patent), NO, SE, SE (European patent), US.

(54) Title: EXCHANGEABLE MOULD



Object of the invention is a mould, particularly a mould to be used in the moulding of plastics, which includes two mould frames (1, 2) to be fastened on top of each other and two moulding plates (3) to be placed between them, and between which an object is manufactured. The mould frames are provided with openings through which the moulding plates, having the same shape as the openings, can be removed. The present moulds form an integrated unit, which cannot be demounted easily, so that each object of a mould of its own is needed. In the mould according to the invention the moulding plates (3) are fastened to the mould frames (1, 2) with fastening devices (6) placed in holes (5) made through the sides of the moulding frames (1, 2).

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Exchangeable mould

The object of the invention is a mould, a mould particularly to be used in casting of plastic, to which belong the mould frames to be fastened on top of each other and the moulding plates to be placed between them, between which an object is manufactured.

In the present casting of plastic used moulds, as for instance in the injection moulding, the mould plates are fastened to the mould frames by means of bolts, which are fastened in holes made in the moulding plates. In addition the moulding plates and the mould frames are centered in regard of the other moulding plates and mould frames with the help of guide pins. The fastening of the moulding plates and the centering of them and the mould frames is an accurate work and it takes time. The moulding plates form nowadays an integral part of the mould, because the detaching and fastening of them requires the taking apart of the mould. For this reason for manufacturing of different objects separate moulds are required. The moulds are expensive to produce and the storage and handling of them takes time and means costs.

The purpose of the invention is to bring forth a mould, in which the moulding plates are easy to change and the mould frame can be used for manufacturing of different objects without having to take the mould apart entirely. In addition the aim of the invention is to bring about a mould, in which the mould frames and the moulding plates can be centered accurately, dependably and easily.

The purpose of the mould is achieved with a mould,

which is characterized by that, what is presented in the claims.

In the mould in accordance with the invention into
5 the mould frames a space has been formed and the
moulding plate is of the same form as the space
and can be placed into the space. Additionally,
in the mould frame on the sides of the space holes
have been formed and the moulding plate can be fastened
10 from the side on the mould frame with the help of
the of the fastening devices placed in the holes.
The space formed in the mould frames is at the end
of the mould frame and the moulding plate can be
easily mounted in its place. The moulding plate
15 is manufactured accurately to measure into the size
of the space formed in the mould frame and it is
fastened simply but tightly in the sideways direction
on the mould frame. The moulding plates can be easily
detached and fastened to the mould frames, so that
20 the same mould frames can be used for manufacturing
of several different objects by changing the necessary
moulding plates and outpushing devices. The advantages
of the mould in accordance with the invention are,
that the making of the mould is easy and relatively
25 light, because it is not necessary to handle the
whole mould, and the making of the mould does not
require a such a diversified machinery as does the
making of the traditional moulds.

30 In a favourable application of the invention in
one of the two mould frames are fastened with wedge-
shapedly narrowing surfaces equipped guiding devices
and in the other mould frame has on the corresponding
spot been fastened with correspondingly wedgeshapedly
35 narrowing grooves quipped counterparts for centering
of the mould frames in regard of each other when
closing the mould. These guiding devices and counter-
parts secure that the mould frames are closed each

time very accurately (with even on the exactitude of about 0.005 mm) to the same centre, whereat the in the device existing or in the traditional guiding of the moulds being inexactitudes are corrected
5 when closing the mould. When the moulding plates are placed into the space in the mould frame they also are positioning themselves very accurately on their spots (with even on the exactitude of about 0.005 mm).

10

In the following the invention is explained more in detail by referring to the attached drawing, in which
figure 1 presents the upper part of one of the two
15 mould frames of a mould in accordance with the invention seen from the above,
figure 2 presents the cross-section of a whole mould cut as shown in figure 1 with the dash lines A-A, and
20 figure 3 presents the cross-section of a whole mould cut as shown in figure 1 with the dash lines B-B.

In the application presented in the figures to the mould belong the mould frames 1, 2 and the between
25 them mountable moulding plates. The moulding plates are placed in the in the mould frame formed to its form mainly rectangle shaped space 4, which space in this case to its form is a square with rounded corners. The moulding plates are made with accuracy
30 of shape to the form of the space 4. The moulding plates are fastened to the mould frames with the fastening devices 6 placed in the holes made from the side on the mould frames. As fastening devices function conoidic fastening screws and on the moulding
35 plates are on the spots of the holes formed fastening sockets 7 for the fastening screws. The conoidic fastening screws fasten the moulding plates tightly on th ir spots, but they are asy to remove without

otherwise d mounting th mould frame. The fastening screws are positioned in the middle of the side, but the number and the positioning of them can vary in different applications.

5

On the mould frames are fastened the guiding devices 8 and the guiding devices corresponding counterpart elements 9 for centering of the mould frames in regard of each other at closing of the mould. In accordance with the pictures the guiding devices are equipped with wedgeshapedly narrowing surfaces and the counterpart elements are equipped with corresponding wedgeshapedly downwards narrowing grooves. The guiding devices and the counterpart elements are positioned opposite to each other on the mould frames and in accordance with figure 1 in the middle part of the side, but in other applications they can be placed on other spots as well. On one of the two mould frames are generally fastened two guiding devices and two counterpart elements, but this also can vary in different applications.

The mould in accordance with the invention can be used for manufacturing of different kinds of objects by changing of the moulding plates and the outpushing device. The desired outpushing device 10 and the desired moulding plates 3 are fastened to the mould frames. The outpushing device is fastened to the lower mould frame 2. The moulding plates are fastened by placing them first in the space 4 of the mould frames and by fastening them with the fastening screws 6. After this the mould frames are placed supported by the supporting pegs 11 (figure 3) on top of each other. The final alignment of the mould is obtained very accurately with the help of the guiding devices 8 and the counterpart elements 9 fastened in the mould frames as they guide themselves in accordance with each other and are guiding the

mould frames and the moulding plates accurately in their respective positions. When the object is manufactured ready the upper mould frame is elevated, the manufactured object is removed with the help of the outpushing device, the upper mould frame is pressed again on its spot and the function is repeated.

When the series needed is manufactured with the moulding plates they are removed from the mould frames for instance by using two outpulling tools, which are mounted in the place of two opposite to each other positioned guiding device or counterpart element and the moulding plates are pulled out. In place of the moulding plates new moulding plates and an outpushing device are changed, which fit into all mould frames of the same size. Hereat the mould frames can be kept in the production continuously and they do not cause any storage or capital costs.

20

The invention is not limited to the application presented here, but it can vary within the frames of the claims.

CLAIMS

1. A mould, particularly a mould to be used in the plastic castings, to which belong the mould frames (1, 2) to be fastened on top of each other and the moulding plates (3) to be placed between them, and between which an object is manufactured, in the mould frames has been formed a space (4) and the moulding plates are of the same form as the space and possible to place into the space, c h a r a c t e r i z e d in, that on the mould frame have on the sides of the space (4) been formed holes (5) and the moulding plate can be fastened from the side direction with the help of the fastening devices (6) placed in the holes of the mould frame.
2. A mould in accordance with the claim 1, c h a r a c t e r i z e d in, that on one of the two mould frames are fastened guiding devices (8) equipped with wedgeshapedly narrowing surfaces and on the other mould frame on the corresponding spot is fastened counterpart elements (9) equipped correspondingly with wedgeshapedly narrowing grooves for centering of the mould frames in regard of each other at the closing of the mould.
3. A mould in accordance with the claim 1 or 2, c h a r a c t e r i z e d in, that the space formed in the mould frame and the moulding plate are mainly a rectangle to their form.
4. A mould in accordance with some of the claims 1-3, c h a r a c t e r i z e d in, that on the sides of the moulding plate have been formed fastening sockets (7) for the conoidic fastening screws (6).

1/2

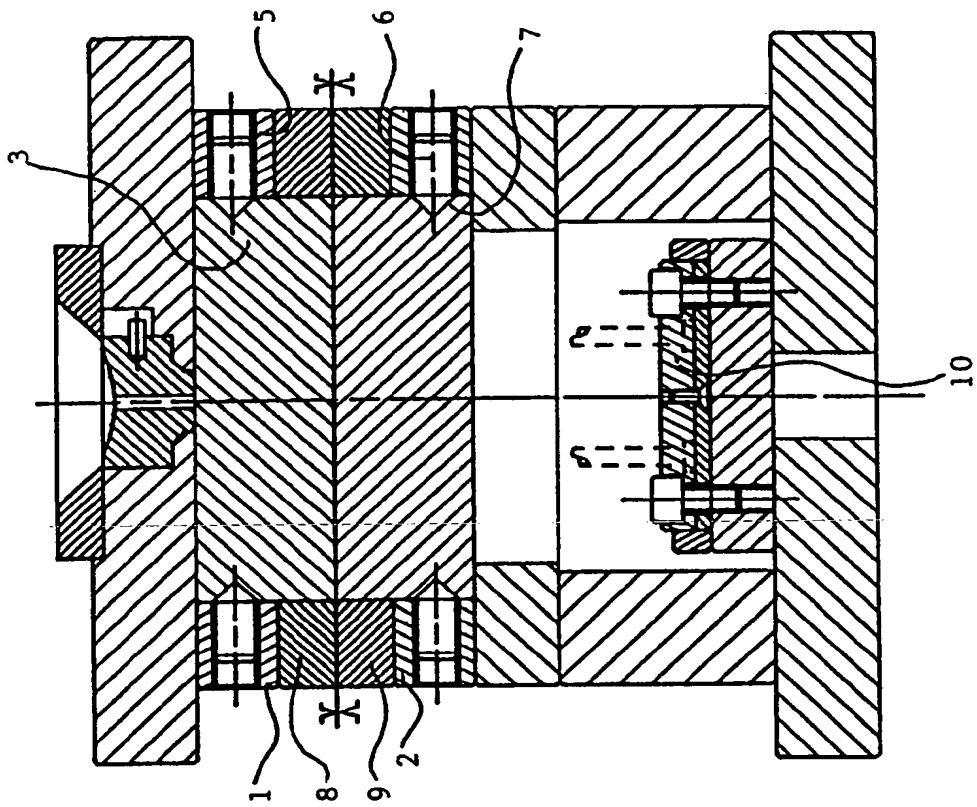


FIG. 2

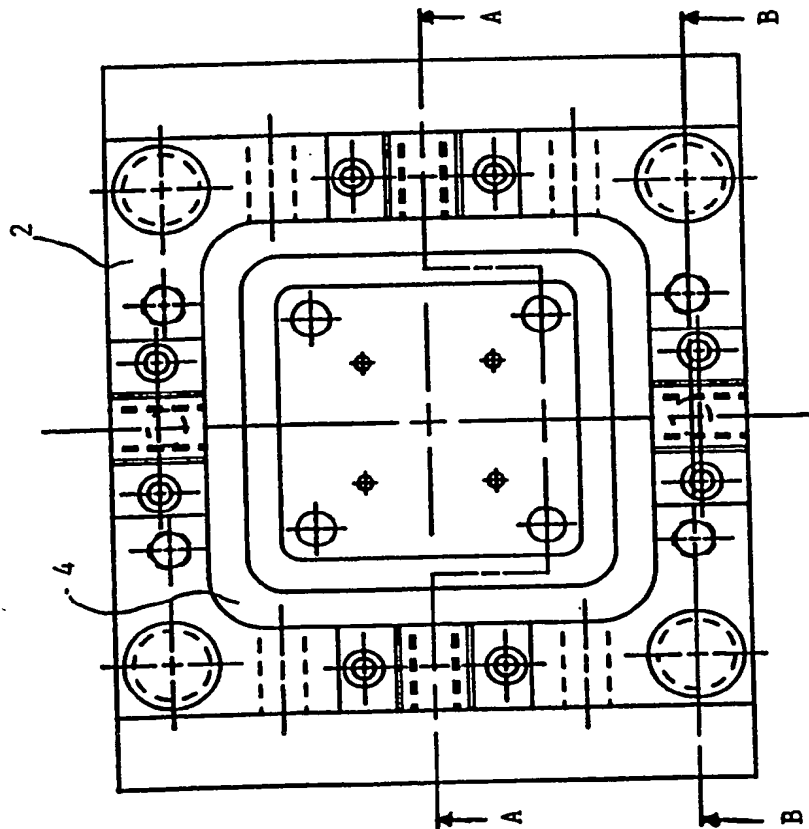


FIG. 1

INTERNATIONAL SEARCH REPORT

International Application No **PCT/FI 90/00021**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 29 C 33/30, 45/26		
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched ⁷</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">Classification System:</div> <div style="width: 45%;">Classification Symbols</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;">IPC5</div> <div style="width: 45%;">B 29 C</div> </div> <div style="text-align: center; font-size: small; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸</div>		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE, A1, 3510329 (WÖRNER, ALOIS) 12 June 1986, see page 13, line 1 - page 14, line 24; figures 1-3 <div style="text-align: center;">--</div>	1,3
X	US, A, 4484880 (SCHWARZ) 27 October 1984, see column 2, line 59 - column 3, line 28 <div style="text-align: center;">--</div>	1
X	US, A, 4500275 (RUHL) 19 February 1985, see figures 1,3; claim 1 <div style="text-align: center;">--</div>	1,3
X	US, A, 4714421 (D'AGOSTINO) 22 December 1987, see column 6, line 30 - line 68; figures 1,4 <div style="text-align: center;">--</div>	1,3
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
10th April 1990		1990 -04- 18
International Searching Authority		Signature of Authorized Officer
SWEDISH PATENT OFFICE		Petter Sörsdahl

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X,P	US, A, 4810182 (GROLL) 7 March 1989, see column 4, line 26 - column 5, line 40; figures 2,3 --	1,3
A	DE, C2, 3311136 (STRACK-NORMA GMBH) 16 January 1986, see figures 1,2; claim 1 --	2
A	US, A, 3743463 (PATRICK ET AL) 3 July 1973, see column 5, line 22 - line 42; figure 1 --	4
A	US, A, 3565016 (JAMES WILLIAM CHRISTIE) 23 February 1971, see figures 1,3; claim 1 -- -----	4

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/FI 90/00021**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A- 4484880	84-11-27	AT-A-B- 386379 CA-A- 1192365 EP-A-B- 0088100 WO-A- 83/01038 AT-A-B- 386380	88-08-10 85-08-27 83-09-14 83-03-31 88-08-10
US-A- 4500275	85-02-19	NONE	
US-A- 4714421	87-12-22	NONE	
US-A- 4810182	89-03-07	DE-A- 3637532 JP-A- 63122511	88-05-11 88-05-26
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US-A- 3743463	73-07-03	BE-A- 772839 CA-A- 943315 DE-A- 2145008 GB-A- 1369004 NL-A- 7112317	72-01-17 74-03-12 72-04-06 74-10-02 72-03-23
US-A- 3565016	71-02-23	GB-A- 1212033	70-11-11

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